

STATE OF CALIFORNIA
California Environmental Protection Agency
Department of Toxic Substances Control

Report to the Legislature

**EVALUATION OF THE SUCCESS OF REMOVING
MERCURY-CONTAINING SWITCHES
FROM VEHICLES and MAJOR APPLIANCES**

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Arnold Schwarzenegger, Governor
State of California

Terry Tamminen, Secretary
California Environmental Protection Agency

Edwin F. Lowry, Director
Department of Toxic Substances Control

REPORT TO THE LEGISLATURE

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EXECUTIVE SUMMARY

Senate Bill (SB) 633 (Stats. 2001, ch. 656), known as the California Mercury Reduction Act of 2001, requires the Department of Toxic Substances Control (DTSC) to prepare a report to the Legislature on both of the following:

- The success of efforts to remove mercury-containing vehicle light switches from vehicles.
- Compliance with the requirements to remove mercury-containing appliance switches.

In preparing this report, DTSC conducted two surveys of businesses that handle discarded vehicles and major appliances. Surveys were mailed to over 3,000 auto dismantlers, auto repair shops, appliance recyclers, and other regulated businesses. DTSC also conducted telephone surveys of similar businesses and reviewed information provided by various trade associations, counties, and the California Integrated Waste Management Board (CIWMB).

Due to the low response rate, DTSC was unable to determine how many of the businesses that repair, recycle, or dispose of vehicles and appliances currently remove and properly manage mercury switches. DTSC made efforts to assess the rate of compliance with the requirements to remove mercury-containing appliance switches by conducting an enforcement initiative focused on appliance recyclers. Inspections conducted at 31 appliance recyclers found no specific violations for failure to remove mercury switches. Some recyclers told DTSC they do not always remove mercury switches from appliances. It should be noted, however, that requirements to remove mercury switches from vehicles do not take effect until January 2005.

In spite of the limitations of the survey data, DTSC's efforts to promote the removal of mercury switches from vehicles and appliances should produce significant increases in the removal of mercury switches from these products, both at end-of-life when they are recycled and, in the case of vehicles, while they are still in service. DTSC has had significant achievements in working toward this goal, including:

- Adopting the Mercury Waste Classification and Management (MWCM) regulations, which identify vehicles and appliances that are to be recycled for scrap metal as hazardous wastes until their mercury switches have been removed (Cal. Code Regs., tit. 22, § 66261.50) and allow mercury switches to be managed as universal waste (Cal. Code Regs., tit. 22, § 66261.9).
- Developing fact sheets and tables that summarize the requirements for managing universal wastes, including the specific requirements that apply to mercury switches.
- Inspecting appliance recycling businesses to assess their mercury switch management practices.

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- Developing detailed guidance documents and fact sheets for the auto repair and scrap metal recycling industries to assist in identifying, removing, and properly managing mercury switches.
- Working with the California State Automobile Association (CSAA) on a pilot program to provide free replacement of mercury light switches in vehicles.

DTSC believes these efforts will significantly increase the removal and proper management of these switches and, consequently, result in greater protection of the public and the environment from exposure to mercury. Additional benefits were achieved by DTSC's work with the State of California Auto Dismantlers Association (SCADA), the Institute of Scrap Recycling Industries (ISRI), and the Appliance Recycling Centers of America (ARCA) in developing and reviewing numerous training materials such as the mercury fact sheet and other materials (Appendices E through J).

DTSC will conduct training and educational workshops for the regulated community in early 2004 and distribute educational materials. DTSC's Web site will also post these materials.

DTSC will enforce the regulations via inspections and taking enforcement action as necessary and appropriate. Additionally, once the requirements of the MWCM regulations are effective (January 1, 2005, for mercury switches in vehicles and February 9, 2006, for mercury switches in major appliances), DTSC expects the rate of mercury-containing switch recycling to increase dramatically.

DTSC has made significant accomplishments in its efforts to promote the removal and proper management of mercury switches. To date, DTSC has:

- Adopted regulations that allow management of mercury switches as universal waste and identify vehicles and appliances that contain mercury switches as hazardous waste.
- Developed three fact sheets on managing universal wastes, including mercury switches, and several tables that summarize universal waste handler requirements.
- Inspected businesses that handle discarded appliances to assess their management of mercury switches.
- Developed guidance documents and fact sheets to assist the auto repair and scrap metal recycling industries in identifying, removing, and properly managing mercury switches.
- Developed, in partnership with CSAA, a pilot program to replace mercury light switches in in-service vehicles.

DTSC believes these efforts will significantly increase the removal and proper management of these switches and, consequently, result in greater protection of the public and the environment from exposure to mercury.

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INTRODUCTION

Mercury is a highly toxic, persistent, and bioaccumulative metal found in light and tilt switches in vehicles and major appliances. Mercury-containing switches are used to control the lights in hoods and trunks of vehicles and are used to control major appliances. These switches often contain between one and three grams of mercury.

Major appliances, which include residential or commercial washing machines, gas stoves, freezers, and water heaters, are often repaired, reconditioned or discarded. Discarded appliances are regulated under the California Metallic Discards Act (Assembly Bill [AB] 1760 [Stats. 1991, ch. 849]) as administered by CIWMB. The Metallic Discards Act requires certain “materials requiring special handling,” to be removed from major appliances before the appliances are crushed for transport, transferred to a baler, or shredded for recycling.

AB 847 (Stats. 1997, ch. 884), added section 25212 to the Health and Safety Code, which states that “materials requiring special handling” that are hazardous wastes are subject to all applicable requirements of the State’s Hazardous Waste Control Law. The bill amended the Health and Safety Code and the Public Resources Code to require the agencies authorized to enforce the State’s Hazardous Waste Control Law (namely, DTSC and the Certified Unified Program Agencies [CUPAs]) to incorporate the regulation of materials that require special handling that are hazardous wastes into their existing inspection and enforcement programs.

The requirement to manage removed mercury switches and other “materials that require special handling” that are hazardous wastes in accordance with the State’s Hazardous Waste Control Law (Health & Saf. Code, div. 20, ch. 6.5) dates back to the adoption of AB 847 in 1997. Under SB 633, failure to remove these materials from a vehicle or major appliance (in compliance with Pub. Resources Code, § 42175) is now also a hazardous waste violation. SB 633 also requires DTSC to encourage the removal of mercury-containing light switches from vehicles, but does not require the removal of these switches from vehicles that are to be processed for scrap.

In 2003, DTSC took a major step toward meeting the objectives of SB 633 by adopting the MWCM regulations (Cal. Code Regs., tit. 22, § 66273.1 et seq.). Though SB 633 did not specifically require removal of mercury switches from vehicles and appliances, DTSC utilized its authority under existing statutes to develop and adopt the MWCM regulations. Under the MWCM regulations, beginning on January 1, 2005, a vehicle that contains one or more mercury light switches typically found in trunks and hoods will be designated as a hazardous waste whenever any person decides to crush, bale, shred, or shear the vehicle. Beginning February 9, 2006, any other product that contains one or more mercury switches, including a major appliance, will also be designated as a hazardous waste, unless and until all mercury-containing switches are removed. Other products that contain mercury switches will become hazardous waste when they become “discarded materials,” as defined in the California Code of Regulations, title 22, section 66261.2. On and after their respective effective dates, disposing of a vehicle that contains a mercury light switch

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or a product that contains any type of mercury switch will only be authorized at a location that has a hazardous waste facility permit. Crushing, baling, shredding, or shearing a vehicle without first removing the mercury light switches, or an appliance without removing all mercury switches, will also require a hazardous waste permit. These provisions of the regulations provide a strong incentive to remove mercury switches from vehicles and appliances before processing them for scrap.

While discarded vehicles and appliances that contain mercury switches will not be automatically considered hazardous wastes until 2005 and 2006 respectively, the MWCM regulations provide an incentive for handlers to voluntarily remove the switches prior to those dates, by allowing removal and management of the switches in accordance with universal waste management standards. The regulations already allow removed mercury switches to be managed either as hazardous waste or as universal waste and will continue to allow generators the option of managing mercury switches as universal waste after the provisions become effective that designate discarded vehicles and appliances with mercury switches as hazardous waste.

Persons who manage mercury switches as universal waste are exempt from many of the usual hazardous waste generator and storage facility requirements, and instead are subject to universal waste handler requirements found in the California Code of Regulations, title 22, chapter 23.

Compared with the requirements for persons who manage most other hazardous wastes, universal waste handlers are:

- Allowed longer accumulation times.
- Subject to simpler record keeping requirements.
- Subject to simpler employee training requirements.
- Exempt from obtaining a U.S. Environmental Protection Agency ID number (most handlers).
- Exempt from using the Uniform Hazardous Waste Manifest and a registered hazardous waste hauler for transporting the waste.

The MWCM regulations provide generators with a strong incentive to remove mercury switches from vehicles and other products. A handler of discarded vehicles or appliances may remove mercury switches without a permit, provided the person complies with a few simple requirements for universal waste handlers. After all mercury light switches have been removed, a vehicle that does not exhibit a hazardous characteristic would no longer be identified as a hazardous waste, and a handler would be free to process it for recycling without being subject to hazardous waste or universal waste management standards. Similarly, a person who removes all mercury switches from a discarded appliance or other product would no longer be required to manage the appliance or product as a hazardous or universal waste, provided the product does not exhibit a hazardous characteristic. However, the removed switches themselves must be managed as universal waste or hazardous waste.

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By designating discarded products that contain mercury switches and discarded vehicles that contain mercury light switches as hazardous wastes, the mercury regulations will provide DTSC and CUPAs with inspection and enforcement authority over businesses that process discarded vehicles and appliances. Without a permit from DTSC or other authorization from DTSC or the CUPA, a business that processes vehicles or appliances without removing the mercury switches would be considered treating a hazardous waste and be in violation of the California Code of Regulations, title 22, chapter 15.

DTSC used several methods for evaluating the success of voluntary efforts to remove mercury light switches from vehicles and the level of compliance with State requirements to remove mercury-containing major appliance switches. Methodologies included mail-in and telephone surveys, inspections, interviews, and a review of Web sites and online databases. These methodologies and their limitations are discussed later in this report.

ACCOMPLISHMENTS

1. DTSC's most significant accomplishment promoting the removal of mercury switches from vehicles, appliances, and other products has been the adoption of the MWCM regulations. The regulations directly support one of the major goals of SB 633: to promote removal of mercury switches from vehicles and appliances and proper management of the switches after removal.

The regulations support this goal in two ways. First, the regulations provide a simple set of management standards for repair shops, vehicle dismantlers, and scrap metal yards that remove and manage mercury switches, making it easier for proper management of the switches. Second, by identifying discarded vehicles and other products that contain mercury switches as hazardous waste, the regulations provide a strong incentive for facilities that handle and recycle end-of-life vehicles and appliances to remove mercury switches, to avoid having to manage entire vehicles and appliances as hazardous waste.

Effective January 1, 2005, to promote the removal of mercury switches typically found in trunks and hoods, the MWCM regulations will designate an entire discarded vehicle that is to be crushed, shredded, sheared, or baled and contains one or more mercury light switches as a hazardous waste, unless and until the hood and trunk mercury light switches have been removed. Effective February 9, 2006, any other discarded product that contains a mercury switch will also be identified as a hazardous waste until all mercury switches have been removed. Once these regulations become effective, DTSC expects the rate at which mercury-containing switches are removed and recycled to increase dramatically.

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2. DTSC has developed and published on its Web site three fact sheets that discuss the State's universal waste regulations, including recently added provisions for managing mercury switches from vehicles and appliances. The first fact sheet provides a brief overview of the new regulations; the second discusses them in detail. DTSC has also published a document that summarizes the requirements (standards for handlers, effective dates, containers, treatment, notification, and record keeping) for each category of universal waste, including mercury switches. The third fact sheet summarizes the provisions of SB 633 and includes some general information on how households should manage mercury-containing hazardous wastes.
3. DTSC inspected 31 businesses that accept appliances for recycling, through random onsite inspections. Inspectors looked for releases of various chemicals, including mercury. All of the inspected businesses either removed the hazardous components for recycling or used a certified contractor for this purpose. Though DTSC did not observe any violations, some recyclers told DTSC they do not always remove mercury switches from appliances.
4. DTSC developed fact sheets and training documents that will be used to educate the regulated public about mercury switch removal and the regulatory requirements that apply to them.
 - Fact Sheet: SB 633 California's Mercury Reduction Act of 2001, May 2002 (Appendix A)
 - Fact Sheet: Managing Universal Waste in California: Rules for Managing some Common Wastes, June 2003 (Appendix B)
 - Fact Sheet: Changes to California's Universal Waste Regulations: Regulations for Managing Some Common Wastes, March 2003 (Appendix C)
 - Summary of Universal Waste Handler Requirements, April 2004 (Appendix D)
 - Fact Sheet: Managing Mercury Switches Found in Vehicles (Scrap Metal Recyclers, Auto Dismantlers, and Auto Repair Shops), June 2004 (Appendix E)
 - Fact Sheet: Managing Mercury Switches Found in Major Appliances (Information for Scrap Metal Recyclers), June 2004 (Appendix F)
 - Waste Management Options: For Mercury-Containing Switches in Vehicles and Major Appliances, June 2004 (Appendix G)
 - Self-Training Manual for Removing Mercury Switches from Major Appliances: A Guide for Appliance Recyclers, June 2004 (Appendix H)
 - Self-Training Manual for Removing Mercury Switches from Vehicles: A Guide for Auto Repair Shops, June 2004 (Appendix I)
 - Self-Training Manual for Removing Mercury Switches from Vehicles: A Guide for Auto Dismantlers, June 2004 (Appendix J)

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DTSC worked with SCADA, ISRI, and ARCA in drafting these fact sheets and guidance documents and providing outreach and training. Using these materials, DTSC plans to have several workshops in early 2004 to provide regulated businesses with practical guidance on how to manage mercury-containing switches effectively and efficiently. DTSC believes that the MWCM regulations and its outreach to the businesses that manage vehicles and appliances with mercury switches will lead to a significantly higher rate of mercury switch removal than is currently seen.

5. CSAA, in collaboration with DTSC, implemented a pilot program to replace mercury light switches, free of charge to motorists, at participating auto repair shops throughout Northern California.

METHODOLOGY

DTSC has undertaken several efforts to promote compliance with the existing requirement to remove mercury switches from end-of-life major appliances prior to crushing or shredding, and voluntary removal of mercury switches from motor vehicles – both those being recycled and those that are still in service. These efforts have included distribution of information to local agencies and businesses (including lists of appliance recyclers, copies of AB 847, and CIWMB's *Appliance Recycling Guide*); and providing outreach education and training to CUPA inspection staff.

In preparing this report, DTSC used several methods to evaluate the success of these efforts:

- Mail-in and telephone surveys.
- Inspections of appliance recyclers.
- Interviews with key stakeholders.
- Review of governmental and non-governmental Web sites and online databases.

Mail-in and Telephone Surveys

In order to quantify the rate at which regulated businesses remove mercury switches from vehicles and appliances, DTSC prepared a survey. Besides serving as a means to collect information, the survey was designed to assist regulated businesses in understanding the mercury switch removal process. The survey's objectives were:

- To obtain general information on the rate of current voluntary removal of mercury light switches from vehicles and (mandatory) removal of mercury switches from appliances prior to crushing or baling.
- To evaluate the ability of regulated businesses to identify and locate mercury switches in vehicles and major appliances.
- To assess the general knowledge of regulated businesses of proper mercury switch removal and handling procedures.

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In addition to providing information on the current practices of the auto repair, vehicle recycling, and scrap metal industries, the survey will serve as a benchmark for assessing the future success of DTSC's ongoing efforts to promote the removal and proper management of mercury switches.

DTSC surveyed 3,396 businesses and industries that have traditionally handled vehicles and discarded major appliances, including:

- Scrap metal recycling;
- Appliance recycling;
- Auto repair;
- Auto dismantling; and
- Solid waste.

The breakdown of the businesses surveyed was as follows:

- 1,551 auto repair shops;
- 1,473 auto dismantlers;
- 320 scrap metal recyclers; and
- 52 solid waste businesses or appliance recyclers.

Mail-in Survey Methodology

DTSC evaluated mandated efforts to remove mercury switches from major appliances and voluntary efforts to remove mercury-containing switches from vehicles. The results are as follows.

DTSC received 190 completed surveys. Survey responses were separated by industry and maintained in a database. The surveys were later analyzed separately. Businesses that provided conflicting information were contacted for clarification. DTSC search methods for compiling the businesses lists and survey methods are described below. The mail-in survey is provided in Appendix L.

Auto Dismantlers:

SCADA provided a list of 1,473 licensed auto dismantling businesses located throughout California, all of which were mailed a survey. Only 42 businesses responded to this survey.

In an effort to increase the response rate, follow-up telephone calls were made to randomly selected businesses that did not submit completed surveys within the allotted two-week period. The response rate improved slightly after the follow-up calls, but it was still lower than the response rates of the other surveyed industries.

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Auto Repair Shops:

The Automotive Services Council of California (ASCC) provided a list of approximately 36,000 auto repair shops currently licensed in California. From that list, 1,551 auto repair shops were surveyed. Only 131 businesses responded. Efforts to increase the response rate were made by conducting follow-up telephone calls which increased the response rate slightly.

Scrap Recyclers:

DTSC identified 320 scrap recycling businesses by their Standard Industrial Classification (SIC) code listings in the California State Water Resources Control Board's (SWRCB's) General Industrial National Pollution Discharge Elimination System Permit storm water database. (The SWRCB database is a comprehensive list of recyclers and dismantlers who are required to have storm water permits. The database is also a source of all different appliance and metal recyclers and dismantler operators.) Only 14 of these businesses responded to the survey. Follow-up telephone calls were made to increase the number of responses; however, only 1 business responded.

Additional Interviews:

CIWMB and waste management departments from 2 counties were contacted by telephone to discuss current management practices for discarded major appliances, and to identify the types of businesses that typically handle discarded major appliances and are most likely to remove mercury switches. Two utilities were contacted to obtain information about their appliance exchange programs. A scrap metal recycler and an auto dismantler were also contacted to obtain their perspectives on current industry practices regarding mercury switches in discarded vehicles and major appliances, and how the new mercury waste regulations will impact their industries.

Telephone Survey Methodology

DTSC conducted a telephone survey to identify businesses that remove mercury-containing switches from discarded major appliances, to assess the regulatory compliance efforts and awareness levels for the identified businesses. The survey targeted businesses that are believed to handle discarded major appliances and removed materials that require special handling from the major appliances. The targeted businesses included landfill/disposal sites, transfer/processing stations, community recycling centers, appliance recycling businesses, household hazardous waste collection centers, and scrap metal recycling businesses.

DTSC developed a database containing 406 waste disposal, transfer, and recycling businesses. The database was compiled from multiple Internet sources, including state and local government databases, and private non-profit databases. The survey was conducted by contacting businesses' managers over the telephone and asking them to answer a series of questions. The survey questions are provided in Appendix M.

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There were 99 businesses selected to participate in the survey; however, only 48 businesses responded. Of these, 26 were landfill/disposal sites; 14 were transfer/processing businesses, community recycling centers, and household hazardous waste collection centers; 4 were scrap metal recyclers; and 4 were appliance recyclers.

Distribution of Information Pursuant to AB 847

In 1998 pursuant to AB 847, DTSC developed a list of “appliance recyclers, used appliance dealers, solid waste facilities, metal scrap yards, and others” that remove mercury switches and other “materials that require special handling” from appliances. The list, with copies of AB 847, was distributed to CUPAs and their “Participating Agencies” to identify the facilities in their jurisdictions.

DTSC also sent letters to businesses on the list, summarizing the provisions of the bill that applied to them. With both letters, DTSC distributed copies of CIWMB’s *Appliance Recycling Guide*, which addressed mercury switches and other “special materials,” the requirements for removing them from appliances prior to recycling, and methods for removing them.

Inspections of Appliance Recycling Businesses

DTSC conducted a number of inspections of appliance recycling firms in recent years to assess and enforce their compliance with the requirement to remove mercury switches and other “materials that require special handling” from appliances prior to crushing or baling. These included:

- 14 joint inspections of appliance recycling businesses in conjunction with the CUPAs in 2000 and 2001;
- 7 independent inspections by DTSC’s Statewide Compliance Division; and
- 10 independent inspections by DTSC’s Task Force Support/Special Investigations Branch.

DTSC randomly selected businesses (small, medium, and large) that accepted refrigerators for scrap metal for inspection. Inspections were conducted at scrap metal yards, appliance repair companies, companies that are in the business of removing materials that require special handling from metallic discards, and landfill operators. Inspectors looked for releases of various chemicals, including mercury. All of the inspected businesses either removed the hazardous components for recycling or used a certified contractor for this purpose. Although DTSC did not observe any violations, some recyclers told DTSC they do not always remove mercury switches (inspection data is provided in Appendix K).

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Outreach Education and Training

DTSC collaborated with CSAA, as part of its commitment to promote corporate environmental stewardship. DTSC and CSAA organized a mercury-switch replacement program along with over 100 CSAA-approved auto repair shops. This program encourages members of the public to have their mercury-containing automobile light switches removed and replaced with non-mercury switches. The program continues to be free to the public, with the entire cost of the switch replacement including parts and labor paid by CSAA. Promotion for the event, which began during Earth Week in 2003, included newspaper and magazine articles. Also, CSAA auto repair service writers publicized the program by explaining it to their customers. The event continues to be a success. During Earth Week alone, over 350 mercury switches were replaced at CSAA Approved Auto Care businesses located throughout Northern California. The promotion will continue until the 32,000 non-mercury switches purchased by CSAA have been placed in California cars.

The success of the mercury-containing switch program was also achieved through:

- MWCM regulation development.
- Workshops and training materials. These materials will be used as training materials in workshops to be held in early 2004. The workshops will focus on providing assistance to regulated businesses in managing universal waste. These materials will be posted on DTSC's Web site and distributed to workshop attendees.
- Work with trade associations. SCADA, ISRI, and ARCA assisted DTSC in developing and reviewing numerous training materials like the mercury fact sheets and other materials (Appendices E through J).
- Universal waste training. Since adoption of the MWCM regulations, DTSC has conducted 10 trainings for its own staff, CUPAs, and the regulated community on mercury-containing waste management requirements and the State's universal waste requirements.

DATA LIMITATIONS

The data compiled in this report came from several sources, but the survey methods used pose certain limitations that preclude us from drawing definitive conclusions on current mercury switch management practices. Despite these limitations, the information collected provides a general picture of current industry practices with regard to mercury switches. Some of the specific data limitations are discussed below.

Mail-in Survey

Because of the low survey response rates, few inferences about mercury switch management practices followed by the industries surveyed can be made. Only 190 of the 3,396 businesses responded to the survey. The numbers of responses received

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from each of the industrial sectors surveyed ranged from 42 auto dismantlers (out of 1,473 surveyed) to 131 auto repair shops (out of 1,551 surveyed). The 1,551 auto repair shops that were sent surveys represent a small fraction of the approximately 36,000 licensed repair shops in California. Relatively low response rates would not, in and of themselves, preclude DTSC from drawing conclusions about the practices of a particular industry. In the case of the survey, there is reason to believe that businesses that chose to respond are more likely to be aware of the presence of mercury switches in vehicles and appliances and are more likely to remove and properly manage mercury switches than the population at large.

Telephone Survey

The telephone survey shared similar types of limitations as the mail survey. The levels to which these limitations influenced the telephone survey, however, differ noticeably from the ways in which they affected the mail survey.

Source Accuracy

Missing and/or inaccurate business information was discovered in DTSC's and SWRCB's databases as well as in databases from SCADA and ASCC. For some industry segments, the number of businesses that had incorrect mailing addresses was greater than the number of businesses that responded to the survey. For example, 63 of the auto dismantling businesses had incorrect mailing addresses while only 42 responded to the survey. Other errors in the databases include incorrectly classified businesses and obsolete business information. DTSC received a response from 14 scrap recyclers, as 38 businesses in the scrap recycler database either no longer existed or were misidentified and are not actually scrap recyclers.

Response Accuracy

A few businesses misinterpreted many of the survey questions, while others appeared to be unsure of how to answer certain questions. A few of the businesses that responded to the survey were not included in DTSC's analysis because they repair brakes and transmissions, and therefore would not be expected to remove mercury switches. Other businesses that did not remove mercury switches reported managing mercury switches as hazardous and universal waste. DTSC later discovered that these businesses misread the question and thought that it asked them to identify the wastes they managed onsite. DTSC was unable to identify false negatives or false positives unless these were accompanied by specific comments.

Survey Limitations

The main purpose of the survey was to objectively evaluate the effectiveness of DTSC's mercury-containing switch removal program. However, due to the low response rate and the data limitations discussed above, it is not possible to quantify the success of DTSC's efforts to encourage voluntary removal of mercury light switches from vehicles, nor the level

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of compliance with the existing requirement to remove mercury switches from major appliances. Although the survey showed that businesses are knowledgeable of mercury-containing switches, it would be difficult to assess how much these businesses know about the presence and location of mercury switches in vehicles.

SUMMARY OF FINDINGS

Surveys

DTSC conducted surveys of auto dismantlers, auto repair shops, scrap metal recyclers, landfills, counties, and utility companies. Two surveys were conducted: a mail-in survey and a telephone survey. Industry research and the survey results form the basis for this evaluation. In conducting the surveys, DTSC considered the methodology and data limitation factors described in the above discussion.

Mail-in Survey Results

DTSC mailed out 3,396 surveys and approximately 190 businesses returned a completed survey. The majority were auto repair shops and auto dismantling businesses.

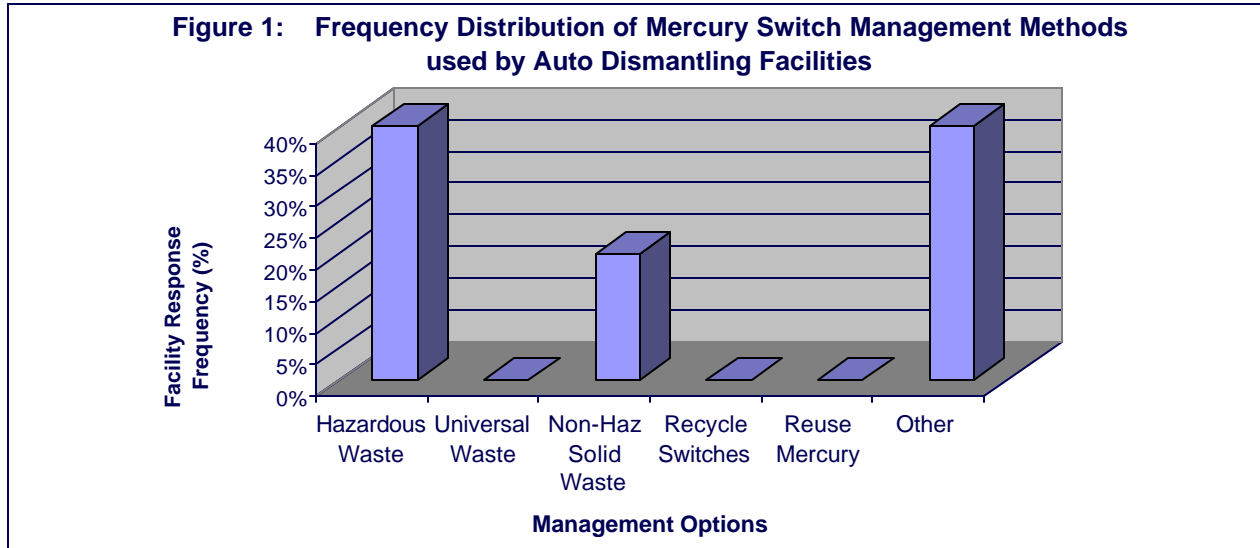
Auto Dismantlers:

Forty-two businesses responded to the survey. Five dismantlers reported removing mercury switches before crushing. See the examples in Table 1 and Figure 1 that show the mercury switch management methods used by auto dismantling facilities that responded to the mail-in survey.

Table 1: Frequency Distribution of Mercury Switch Management Methods used by Auto Dismantling Facilities.

Current Management Practice	Total	Percent
Manage as hazardous waste	2	40%
Manage as universal waste	0	0%
Manage as non-hazardous solid waste	1	20%
Recycle switches	0	0%
Reuse mercury	0	0%
Not specified	2	40%

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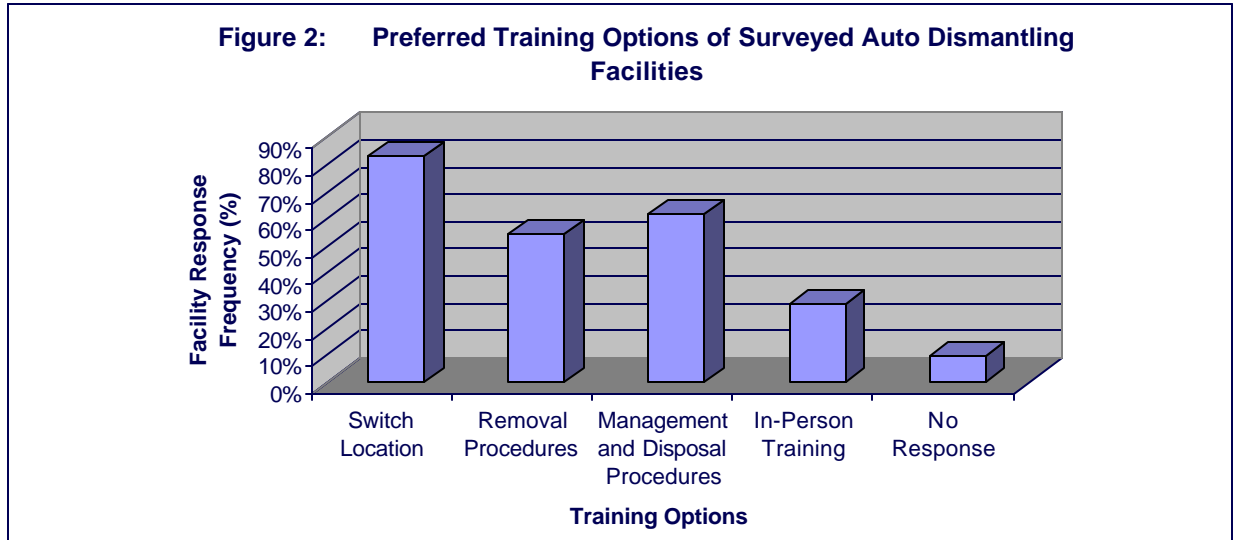
Thirty-one dismantlers out of the 42 had prior knowledge of the presence of mercury switches. Auto dismantlers were also asked about the types of information about mercury switches they would like to receive and how they would prefer to receive it. Thirty-five of the respondents felt it would be useful to receive information on the locations of mercury light switches. More than half of the businesses also felt that written procedures for removal, management, and recycling of mercury switches would be helpful.

See the examples in Table 2 and Figure 2 that summarize the responses of auto dismantlers to questions about their training preferences.

Table 2: Preferred Training Options for Surveyed Auto Dismantling Facilities.

Training Option	Total	Percent
Switch location	35	83%
Removal procedures	23	55%
Management and disposal procedures	26	62%
In-person training	12	29%
No response	4	10%

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Auto Repair Shops:

One hundred thirty-one businesses responded to the survey. Out of 131 shops, 17 reported removing mercury switches from the vehicles they serviced. Most had prior knowledge of the presence of mercury switches in vehicles and most had received some form of training on mercury switches, although none specified the type of training. While some repair shops reported that they do remove mercury-containing switches from vehicles, others said they rarely remove them.

Scrap Metal Recyclers:

Fourteen scrap metal recyclers responded to the survey. Only 10 of the 14 recyclers had prior knowledge of mercury in major appliances. Most knew that mercury switches may be present in vehicles and major appliances. Nine said they had learned of the presence of mercury switches in vehicles and appliances from trade associations. Six respondents reported learning about mercury switches in vehicles from training and regulatory agencies.

Other Businesses:

Three landfills responded to the survey. All said they had prior knowledge of mercury switches in major appliances. Two said they had learned about mercury switches from regulatory agencies.

Counties:

Staff members from two counties were questioned about mercury switches and waste management of discarded vehicles and appliances. Both counties believed that many landfills and disposal sites accept discarded major appliances. One of the county's staff thought that certain transfer stations and household hazardous waste collection

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centers that accept discarded major appliances may also remove mercury switches. Many of these businesses employ outside contractors to remove other materials that require special handling from the major appliances.

Utilities:

Two utilities were contacted about their management of mercury switches in refrigerators that are collected from their customers as part of refrigerator exchange programs. Both utilities employ outside contractors that specialize in appliance recycling to manage their refrigerator exchange programs. Many of these recyclers also operate municipal curbside and collection programs for cities. Major appliances collected are taken to their processing centers where items, including mercury switches, are removed from the appliances. Both utilities have contract agreements with ARCA.

Telephone Survey Results

Because of the low response to the mail-in survey, a telephone survey was conducted. In the telephone survey, 99 businesses were selected to participate; however, only 48 businesses responded. Of the 48 businesses, 26 were landfill/disposal sites; 14 were transfer/processing businesses, community recycling centers, and household hazardous waste collection centers; 4 were scrap metal recyclers; and 4 were appliance recyclers.

The results of the telephone surveys for those businesses are as follows:

Scrap Metal Recyclers:

Surveyed were 4 scrap metal recyclers. The survey reported that 2 recyclers accepted and handled discarded major appliances while the other 2 recyclers did not accept or handle discarded major appliances. Only 1 of the recyclers reported having prior knowledge of mercury switches in major appliances that was obtained through training. None of the recyclers reported the quantities of discarded major appliances they received each year between 1999 and 2003. None of the businesses clearly responded to the type of training that would benefit them the most.

Landfills/Disposal Sites:

Surveyed were 26 landfills/disposal sites. The survey showed that 20 sites reported accepting or handling discarded major appliances while 6 sites did not accept or handle discarded major appliances. When asked about which type of training would be most helpful, 8 sites accepting and handling discarded major appliances chose "in-person training," 6 felt that "written management and disposal procedures" would be helpful, 8 respondents selected "written switch location," while 8 of the 20 businesses did not respond to the question regarding training needs.

Evaluation of the Success of Removing Mercury-Containing Switches From Vehicles and Major Appliances

Appliance Recyclers:

Surveyed were 4 appliance recyclers. Of those 3 recyclers, reported accepting and handling discarded major appliances but 1 recycler did not accept or handle discarded major appliances. When asked about which type of training would be most helpful 2 of the 4 recyclers chose “written management and disposal procedures,” 1 recycler selected “written switch location,” “written switch removal,” and “in-person training” and 1 recycler failed to clearly respond to the question.

Transfer/Processing Stations, Recycling Centers and Household Hazardous Waste Collection Centers:

Surveyed were 14 businesses. Out of the 14 business, 7 reported accepting and handling discarded major appliances while 7 did not accept or handle discarded major appliances. When asked about which type of training would be most helpful 5 of the 7 businesses accepting and handling discarded major appliances chose “in-person training,” 1 respondent felt that “written management and disposal procedures” would be helpful, and 1 respondent did not answer the question.

CONCLUSIONS

Due to the limitations of the survey results, DTSC cannot draw broad conclusions about the rate at which mercury-containing switches are currently removed from vehicles and major appliances. Although, the data suggests that additional work is needed to increase awareness and compliance, businesses that handle vehicles and appliances appear to be willing to comply with new and existing requirements to remove mercury switches. Most survey respondents said they were aware that vehicles and major appliances may contain mercury switches but do not currently remove them. Some respondents that remove mercury switches do not manage them properly after removal. Most respondents said they intend to remove mercury switches and manage them properly in the future. It should be noted, however, that requirements to remove mercury switches from vehicles do not take effect until January 2005.

In spite of the limitations of the survey data, DTSC's efforts to promote the removal of mercury switches from vehicles and appliances should produce significant increases in the removal of mercury switches from these products, both at end-of-life when they are recycled and, in the case of vehicles, while they are still in service. DTSC has had significant achievements in working toward this goal, including:

- Adopting the MWCM regulations, which identify vehicles and appliances that are to be recycled for scrap metal as hazardous waste until their mercury switches have been removed and allow mercury switches to be managed as universal waste.
- Developing fact sheets and tables that summarize the requirements for managing universal wastes, including the specific requirements that apply to mercury switches.

Evaluation of the Success of Removing Mercury-Containing Switches From Vehicles and Major Appliances

- Inspecting appliance recycling businesses to assess their mercury switch management practices.
- Developing detailed guidance documents and fact sheets for the auto repair and scrap metal recycling industries to assist in identifying, removing, and properly managing mercury switches.
- Working with CSAA on a pilot program to provide free replacement of mercury light switches in vehicles.

DTSC believes these efforts will significantly increase the removal and proper management of these switches and, consequently, result in greater protection of the public and the environment from exposure to mercury. Additional benefits were achieved by DTSC's work with SCADA, ISRI, and ARCA in developing and reviewing numerous training materials like the mercury fact sheet and other materials (Appendices E through J).

DTSC will conduct training and educational workshops for the regulated community in early 2004 and distribute educational materials. These materials will also be posted on DTSC's Web site.

DTSC will enforce the regulations via inspections and take enforcement action as necessary. Additionally, once the requirements of the MWCM regulations are effective (January 1, 2005, for mercury switches in vehicles and February 9, 2006, for mercury switches in major appliances), DTSC expects the rate of mercury-containing switch recycling to increase dramatically.

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Members of DTSC who contributed to the development of this report:

Karl Palmer	Chief, Regulatory and Program Development Branch
Sonia Low	Chief, Onsite Hazardous Waste Management Section
Bob Aragon	Senior Hazardous Substances Engineer
Mike Horner	Senior Hazardous Substances Scientist
Tim Ogburn	Senior Hazardous Substances Scientist
Mickey Pierce	Senior Hazardous Substances Scientist
Mary Wilson	Hazardous Substances Scientist
Andre Algazi	Hazardous Substances Scientist
Clyde West	Hazardous Substances Scientist

Other contributors to this report:

Geomatrix Consultants, Inc.
State of California Auto Dismantlers Association (SCADA)
Institute of Scrap Recycling Industries (ISRI)
Appliance Recycling Centers of America (ARCA)

Report to the Legislature on:
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Appendix A

Fact Sheet: SB 633 California's Mercury Reduction Act of 2001
May 2002

http://www.dtsc.ca.gov/Schools/EA_FS_SB633.pdf

Report to the Legislature on:
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Appendix B

Fact Sheet: Managing Universal Waste in California
(Rules for Managing Some Common Wastes)
June 2003

http://www.dtsc.ca.gov/PublicationsForms/HWM_FS_UWR.pdf

Appendix C

Fact Sheet: Changes to California's Universal Waste Regulations
(Regulations for Managing Some Common Wastes)
March 2003

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_FS_UWRChanges.pdf

Appendix D

Summary of Universal Waste (UW) Handler Requirements
April 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWM_REP_UW-Requirements.pdf

Appendix E

Fact Sheet: Managing Mercury Switches Found in Vehicles
(Scrap Recyclers, Auto Dismantlers, and Auto Repair Shops)
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_FS_Merc-Vehicles.pdf

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Appendix F

Fact Sheet: Managing Mercury Switches Found in Major Appliances
(Information for Scrap Metal Recyclers)
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_FS_Merc-Appliances.pdf

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Appendix G

Waste Management Options:
For Mercury-Containing Switches in Vehicles and Major Appliances
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_POL_Guidance_Mercury_Waste-Mgmt-Options.pdf

Appendix H

Self-Training Manual for Removing Mercury Switches from Major Appliances:
A Guide for Appliance Recyclers
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_POL_Guidance_Mercury_Appliances.pdf

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Appendix I

Self-Training Manual for Removing Mercury Switches from Vehicles:
A Guide for Auto Repair Shops
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_POL_Guidance_Mercury_Auto-Shops.pdf

Appendix J

Self-Training Manual for Removing Mercury Switches from Vehicles:
A Guide for Auto Dismantlers
June 2004

http://www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_POL_Guidance_Mercury_Auto-dismantlers.pdf

Report to the Legislature on:
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Appendix K

State Regulatory Program Division (SRPD)
2000/2001 Appliance Recyclers Inspection Data

**State Regulatory Programs Division
2000/2001 APPLIANCE RECYCLERS INSPECTION DATA**

FACILITY	TYPE	RECYCLING INFORMATION	SB 847 VIOLATIONS	OUTCOME
Sears, Roebuck (Escondido)	Retail	Does not accept or recycle white goods; refer customers to a white goods recycler.	No	In compliance
Bob's Used Appliances (Riverside)	Recycler	Repairs white goods to sell; those he can't repair are sent offsite for salvaging; does salvage some replacement parts like thermometers; does not take out CFCs.	No	In compliance
Palm Springs Recycling (Palm Springs)	Recycler	Accepts white goods but does not dismantle them; sends them offsite for salvaging.	No	In compliance
Appliance Recycling Factory (Riverside)	Recycler	Dismantles and salvages white goods; removes CFCs, mercury, and used oil only; does not accept white goods with PCBs.	No	In compliance
Davis Street Transfer Station (San Leandro)	Recycler	Accepts white goods but has offsite contractor come in to remove AB 847 waste.	No	In compliance
Ecology Scrap Metal Recycling (San Diego)	SQG	Only accepts white goods where liquids have been removed prior to acceptance.	No	In compliance
Ecology Auto Wrecking (San Diego)	Recycler	Collects CFCs and takes to offsite facility for consolidation and recycling; not removing sodium azide canisters prior to crushing.	Yes	Violations not related to mercury light switches
Calipatria State Prison (Calipatria)	Vocational training program	CFC refrigerants recycled onsite; oils sent offsite as HW.	No	In compliance
Alco Iron & Metal (San Leandro)	Recycler	Does not accept or recycle white goods; refer customers to a white goods recycler.	No	In compliance

**State Regulatory Programs Division
2000/2001 APPLIANCE RECYCLERS INSPECTION DATA**

FACILITY	TYPE	RECYCLING INFORMATION	SB 847 VIOLATIONS	OUTCOME
WC Rose (San Leandro)	Recycler	Offsite contractor comes in to service white goods for AB 847 materials; whole motors (where HW has not been removed) are sold to offsite recycler.	No	In compliance
Sims Metal America (Stockton)	SQG	Only accepts white goods where liquids or CFCs have been removed prior to acceptance.	No	In compliance
The Learner Co. (Stockton)	SQG	Only accepts white goods where liquids or CFCs have been removed prior to acceptance.	No	In compliance
Universal Recycling (Santee)	Recycler	Accepts white goods but does not dismantle them; sends them offsite for salvaging; does drain white goods for CFCs - CFCs sent offsite for recycling.	No	In compliance
Delta Scrap Iron Processor	SQG	Auto wrecking yard; no white goods found on site.	No	In compliance

Appendix L

Mail-in Survey

MERCURY CONTAINING SWITCHES IN VEHICLES AND MAJOR APPLIANCES

SURVEY QUESTIONNAIRE

Survey Background

This voluntary survey regarding mercury-containing switches in vehicles and major appliances will be used to help the California Department of Toxic Substances Control (DTSC) implement the California Mercury Reduction Act of 2001 (Senate Bill 633). Note that any and all information you provide is solely for research purposes. The Mercury Reduction Act requires DTSC to provide information, through training workshops and self-training materials, on mercury-containing switches in vehicles and major appliances, and their removal and replacement with non-mercury switches. Your participation in this survey will provide information that will enable us to better serve you. Please complete the items below that apply to your facility. If an item does not apply to your activities, or the information is unknown, leave the item blank. Further information regarding this survey is available from Jon Clemens at Geomatrix Consultants, Inc. at (949) 642-0245. Further information about this legislation is available at: <http://www.dtsc.ca.gov/HazardousWaste/Mercury/>

For the purposes of this survey, the following definitions apply:

- **Vehicle:** any device used for transportation, domestic and imported.
- **Major Appliance:** includes residential or commercial washing machines, gas stoves, freezer, or water heaters.

Please use the enclosed, postage-paid envelope to mail the completed survey form before **June 18, 2003** to the following address:

**Mercury Survey Response
Geomatrix Consultants, Inc.
330 West Bay Street, Suite 140
Costa Mesa, California 92627**

Section 1 – Preliminary Questions:

- a. Which of the following best describes your facility? Please circle the operation(s) that best describe(s) your facility.

Auto Dismantling

Auto Repair

Scrap Metal Recycling

Other (Please Specify) _____

- b. Prior to receiving this survey, were you aware that many vehicle and major appliance switches contain mercury?

Vehicles: Yes ☐ No ☐ **Major Appliances:** Yes ☐ No ☐

If you answered No to both, skip the next question.

- c. How were you made aware that vehicles/ major appliances contain mercury switches? Please mark the appropriate spaces provided below:

Information Source	Vehicles	Major Appliances
Training		
Primary Manufacturer		
Part Manufacturer		
Manufacturer/Repair/Dismantler Association or Trade Group		
Regulatory Body		
Media		
Other		

MERCURY CONTAINING SWITCHES IN VEHICLES AND MAJOR APPLIANCES

SURVEY QUESTIONNAIRE

Section 2 - Industry Activity Questions:

- a. Does your facility currently remove mercury switches from vehicles or major appliances?

No ☐

Some ☐

Most ☐

All ☐

If you answered No, skip to Section 3. Otherwise, continue to answer the questions for the activities performed at your facility: (b) auto repair, (c) auto dismantling, and (d) scrap recycling.

- b. **Auto Repair Facilities** – Please circle the approximate number of vehicles repaired and the approximate number of switches removed for each year from 1999 through 2003.

Year	# of Vehicles Repaired				# of Switches Removed				
1999	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2000	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2001	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2002	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2003 (Projected)	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000

- c. **Auto Dismantling Facilities** – Please circle the approximate number of vehicles processed and the approximate number of switches removed for each year from 1999 through 2003.

Year	# of Vehicles Processed				# of Switches Removed				
1999	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2000	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2001	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2002	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2003 (Projected)	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000

MERCURY CONTAINING SWITCHES IN VEHICLES AND MAJOR APPLIANCES

SURVEY QUESTIONNAIRE

- d. **Scrap Metal Recyclers, Including Appliance Recyclers** – Please circle the approximate number of major appliances recycled and the approximate number of switches removed for each year from 1999 through 2003.

Year	# of Major Appliances Recycled				# of Switches Removed				
1999	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2000	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2001	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2002	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000
2003 (Projected)	0	1-100	101-1000	>1000	0	1-10	11-100	101-1000	>1000

Section 3 – Mercury Switch Management Questions:

- a. How do you currently manage mercury-containing switches removed from vehicles or major appliances? Please mark the appropriate spaces provided below.

<i>Management Option</i>	<i>Vehicles</i>	<i>Major Appliances</i>
Manage as hazardous waste		
Manage as universal waste		
Manage as normal refuse		
Recycle switches		
Reuse mercury		
Other (Specify)		
Unknown		

- b. What training would be most helpful most helpful in assisting you in the proper management of switches? Please mark the appropriate spaces provided below.

<i>Education Option</i>	<i>Vehicles</i>	<i>Major Appliances</i>
Written switch location information		
Written removal procedures		
Written management & disposal procedures		
In-person training		

Thank you for your time in completing this survey. If you have any other comments or questions for us regarding this survey, please let us know:

[illegible]

Name: _____

Facility Location: _____

E-mail: _____

Appendix M

Telephone Survey

Facility ID ☐ Survey interview Completed?

Facility Name

Address

City State Zip Code

Phone Number

Facility Category

Facility Classification

☐ Is this facility privately owned?

Who owns this facility?

1. Does your facility accept and handle discarded major appliances? ☐

2. How would you describe your facility? (Check all that apply)

- ☐ Appliance Recycling
- ☐ Scrap Recycling
- ☐ Land disposal
- ☐ Transfer/Processing Station
- ☐ Materials Recovery Facility (MRF)
- ☐ Household Hazardous Waste Facility

Other (specify)

3. What happens to the major appliances that your facility receives?

- ☐ Dismantle
- ☐ Crush
- ☐ Bale
- ☐ Shred
- ☐ Shear
- ☐ Sent offsite

4. Does your facility remove CFCs, PCBs, waste oils, or other items that require special handling from the appliances? ☐

Or are the appliances sent offsite to have these items removed? ☐

Who removes these items?

5. How long has your facility been removing these special items?

6. Have you ever heard of mercury containing switches and flame sensors that are found in appliances? ☐

7. How did you find out about mercury switches and sensors in major appliances?

specify

8. Do you know if any of these appliances contain mercury switches and flame sensors?

- ☐ Gas ranges and ovens
- ☐ Clothes washers
- ☐ Chest freezers
- ☐ Commercial hot water heaters

9. Does your facility remove mercury-containing switches and flame sensors from the major appliances it receives?

10. Approximately, how many major appliances did your facility handle in:

1999:

2000:

2001:

2002:

2003:

11. Approximately, how many mercury switches and sensors did your facility remove in:

1999:

2000:

2001:

2002:

2003:

12. How does your facility currently manage mercury switches that are removed from discarded appliances? (Pick all that apply)

- ☐ Hazardous Waste
- ☐ Universal Waste
- ☐ Normal Refuse

13. Does your facility currently have a policy against accepting appliances that have mercury switches? ☐

14. What training would be most helpful to your facility in proper management of mercury switches and sensors? (Pick all that apply)

- ☐ Written location of mercury switches and sensors

- ☐ Written removal procedures
- ☐ Written management and disposal procedures
- ☐ In-person training

Thank you very much for your cooperation.

For your information, we will be scheduling workshops about the latest regulations on removing and managing mercury switches. We would like to send you additional information regarding the times and locations of these workshops. Could you please confirm whether or not this is the correct mailing address of your facility?

☐

If you have any additional questions regarding mercury switches please call Jon Clemens at 949-642-0245.